

THE EFFECT OF PRESERVATIVES ON METABOLISM.

BY H. W. WILEY, M.D.

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The question of the use of preservatives in food products has of late assumed an importance greater even than in previous years. A tendency to legislation of a prohibitory character has developed in all civilized countries. Many preservatives are now forbidden by law in Germany, France, Italy, Spain, Austria, and many of the States of the United States. It seems that it is scarcely just to legislate against preservatives individually rather than as a class. Universally excepted from prohibitory or restricted legislation are the preservatives in common use, namely, sugar, salt, vinegar and wood smoke. The basis of all prohibitory legislation, at least, the alleged basis lies in the fact that the preservatives restricted or forbidden are injurious to health. If literature on the subject is consulted some conflicting statements are found emanating from scientific sources apparently of equal reliability. It is evident, therefore, that there is a very widespread difference of opinion among physiological chemists and hygienists respecting the effect of preservatives added to foods upon the public health. The data of research are very extensive in experiments *in vitro*, with the lower animals and with man. It cannot be denied that there are many grounds for the prohibitive and restrictive legislation referred to. There are other questions which must be considered in connection with this, namely, the dangers which attend the use of nonpreserved foods and the effects which the prohibition of preservatives might have upon the price of foods. The latter is a purely economic subject and does not enter into the present discussion. It is evident that if a preservative is injurious to health it will in some way affect the metabolic process. It will either derange digestion or interfere with assimilation and excretion.

There are many apparently almost insurmountable difficulties in the experimental determination of this problem with man himself. A merely negative result is not sufficient to secure a verdict of acquittal. The reason of this is apparent, namely, the fact that in-

dividuals present such marked differences in their powers of resistance. One person may be affected with great facility while another person, subjected to the same treatment shows no sign of injury. The object of restrictive laws is, of course, the protection of the weakest and not of the strongest. Hence, I think it may be laid down as a direct principle of legislation that the addition of any substances to foods whatever not necessary in their preparation which affect the health of the most susceptible should be prohibited or so regulated that danger of injury even of the weakest may be eliminated.

I have now to briefly record the results of experimental work on strong and healthy young men. I can do no more than merely state the principal points which were noticed. First, the action of borax and boric acid on nitrogen metabolism was extremely slight. There was, however, a very slight tendency manifested in the experiments which extended over a period of nearly eight months to inhibit the excretion of nitrogen. The general effect, however, on nitrogen metabolism is not of sufficient magnitude to warrant the drawing of any definite conclusions. The effect of the borax and boric acid upon the metabolism of phosphoric acid is very marked. A very much larger quantity of phosphoric acid is excreted under the influence of these preservatives than without them. Borax and boric acid appear to increase the digestibility of the fats in food. In other words there is slightly less fat in the feces during the administration of these bodies than without them. These preservatives have a slight tendency to diminish the utilization of calories of foods. In other words, there is a great number of non-metabolized calories in the feces during the administration of the preservatives than without them. Both boric acid and borax have a slight tendency to increase the traces of free albumen in the urine. Boric acid has a decided tendency to increase the acidity of the urine. Borax has a decided tendency to diminish the acidity of the urine, establishing often the amphoteric reaction and occasionally an alkaline reaction. Both these bodies when exhibited over long periods in small quantities tend to disturb the digestion by diminishing the appetite and inducing a feeling of heaviness in the head or often headache of a persistent character. The results of these influences are seen in a gradual diminution of weight.

In large doses, from one to three grams per day, both boric acid

and borax, when their use is continued for a short time, tend to produce a feeling of distress and even nausea. There is, however, no tendency to produce diarrhea. The general effect produced by borax and boric acid upon health and digestion is decidedly unfavorable, whether by large doses over a short period of time or in the case of small doses, namely seven and one half grains or half a gram per day, over a period of fifty days.

BUREAU OF CHEMISTRY, U. S. DEPARTMENT OF
AGRICULTURE, WASHINGTON, D. C.